

WE CLAIM:

- 10
1. An active chlorine containing solid unit containing a chlorine source and an
5 stable source of dye, the solid unit comprising:
(a) about 10 to about 200 parts by weight of a solid active source of
chlorine per each part of dye; and
(b) a source of a dye, the dye comprising a particulate dye having a
minimum particle size of about 200 microns, wherein the solid unit comprises a
major dimension greater than about 2 millimeters and a weight greater than
about 2 grams, the solid unit substantially free of an amount of free water
sufficient to act as a reaction medium between the solid chlorine source and the
dye.
- 15 2. The solid unit of claim 1 wherein the dye comprises a dye with a minimum
particle size of about 500 microns and a density less than 0.9 gram-cm^{-3} .
- 20 3. The solid unit of claim 1 wherein the solid unit comprises a cylindrical tablet
having a diameter of about 4 to 75 millimeters and a thickness of about 1 to 25
millimeters.
- 25 4. The solid unit of claim 1 wherein the solid chlorine source comprises an
alkali metal dichloroisocyanurate dihydrate.
5. The solid unit of claim 1 wherein the solid unit comprises a spheroid having a
major dimension of about 5 to 60 millimeters and one perpendicular dimension of about
1 to 50 millimeters.
- 30 6. The solid unit of claim 4 wherein the solid chlorine source comprises an
encapsulated alkali metal dichloroisocyanurate dihydrate.

7. The solid unit of claim 1 wherein the dye comprises a granular dye having a particle size greater than about 600 microns and a density less than about 0.85 grams-cm⁻³.

5

8. A method of using the solid unit of claim 1 in a cleaning or sanitizing operation, the method comprises:

(a) placing a solid unit, comprising an active chlorine source and a dye, in a volume of an aqueous liquid in a container, the weight ratio of the solid to the aqueous solution being about 0.1 to 20 grams per liter of water to form a dye colored, active-chlorine solution;

10

(b) contacting ware with the aqueous active-chlorine solution during cleaning or sanitizing operations for a period of up to 4 hours and after detecting a color change, either replacing the aqueous solution or replenishing the aqueous solution with additional chlorine source.

15

9. A particulate composition forming an aqueous solution having an active chlorine source and a dye, the powdered concentrate comprising:

(a) about 1 to 90 wt% of an encapsulated source of halogen; and

(b) an effective amount of dye;

wherein the concentrate is has substantially no free water, has an extended shelf life of greater than one month and when added to an aqueous diluent provides a dye that indicates the presence of an active halogen concentration for a predetermined time.

20

10. The composition of claim 9 wherein the source of halogen comprises a source of chlorine.

25

11. The composition of claim 10 wherein the source of chlorine comprises chloroisocyanurate compound.

30

12. The composition of claim 9 which also comprises an acid source to obtain a pH less than 7 in the aqueous solution. ≈ 5

13. The composition of claim 9 wherein the indicator comprises FD&C dye No. ≈ 5

14. The composition of claim 9 wherein the indicator comprises FD&C dye No. ≈ 6

15. The composition of claim 12 wherein the acid source comprises a solid acid. ≈ 7

16. The composition of claim 9 wherein the acid salt comprises sodium dihydrogen phosphate, sodium hydrogen tartrate, sodium hydrogen sulfate, or mixtures thereof. ≈ 8

17. The composition of claim 9 wherein the builder salt comprises sodium sulfate, sodium carbonate, trisodium phosphate, sodium bicarbonate or mixtures thereof. ≈ 9

18. The composition of claim 9 wherein the concentration of dye in the concentrate is adjusted such that the dye color changes or is depleted during a useful predetermined period of time during which the sanitizer solution can be used for its intended purpose and maintain at least 50 ppm active chlorine. ≈ 10

19. An aqueous liquid cleaning or sanitizing composition containing a dye that indicates chlorine concentration, the liquid comprising a major proportion of an aqueous diluent, and ≈ 11

- (a) a source of acid;
- (b) an effective amount of a dye to obtain a colored solution for a predetermined period of time;
- (c) an effective cleaning or sanitizing amount of a halogen bleach;

wherein the aqueous solution has a pH less than 7 and the dye color is depleted or changed before the concentration of halogen is depleted to less than 50 ppm from the solution.

Sub 5
at cont 18
20. The concentrate of claim 19 wherein the source of halogen comprises a source of chlorine.

Sub B8
21. The composition of claim 20 wherein the source of chlorine comprises a chloroisocyanurate compound.

10

~~22. The composition of claim 19 which also comprises a builder salt.~~

Sub B9
23. The composition of claim 19 wherein the indicator comprises FD&C dye No. 40.

15

24. The composition of claim 21 wherein the chlorine source comprises an encapsulated alkali metal dichloroisocyanurate dihydrate.

25. The composition of claim 19 wherein the acid source comprises a solid acid.

20

26. The composition of claim 19 wherein the acid salt comprises sodium dihydrogen phosphate, sodium hydrogen tartrate, sodium hydrogen sulfate, or mixtures thereof.

Sub 25
at 15
27. The composition of claim 19 wherein the builder salt comprises sodium sulfate, sodium carbonate, trisodium phosphate, sodium bicarbonate or mixtures thereof.

28. The composition of claim 19 wherein the concentration of dye in the concentrate is adjusted such that the dye color changes or is depleted during a useful period of time during which the sanitizer solution can be used for its intended purpose.

30

~ 20

29. A method of cleaning or sanitizing hard surfaces comprising:

(a) contacting the hard surface with an aqueous solution comprising the composition of claim 9, forming a surface having the aqueous liquid comprising a halogen source; and

(b) removing the aqueous liquid halogen source.

30. A method of hand washing ware in a sink having two or more basins, using a stable dye in an aqueous oxidative chlorine based cleaner or sanitizer composition, the method comprising:

(a) contacting ware with an aqueous detergent in a first basin to remove soil, producing cleaned ware; and

(b) contacting the cleaned ware in a subsequent basin with an aqueous sanitizer solution comprising an effective amount of a chlorine source, the sanitizer solution additionally comprising a dye that is sufficiently stable in the aqueous solution to maintain at least some detectable color in the sanitizing solution after greater than 90% of the oxidizing species have been consumed.

31. The method of claim 30 wherein the chlorine source comprises an alkali metal hypochlorite.

32. The method of claim 31 wherein the hypochlorite sanitizer comprises sodium hypochlorite.

33. The method of claim 30 wherein the chlorine source comprises a chlorinated isocyanurate compound which generates hypochlorous acid at the pH.

34. The method of claim 30 wherein the cleaned ware is contacted with a potable water rinse to form a rinsed cleaned ware prior to contacting the rinsed cleaned ware with the sanitizing solution.

35. The method of claim 30 wherein the aqueous sanitizer solution has a pH of less than about 7, the pH selected such that the concentration of OCl^- is minimized and the concentration of HOCl is maximized. *~27*

5

36. The method of claim 34 wherein the cleaned ware is contacted with the aqueous rinse for approximately 1 to about 30 seconds and the rinsed cleaned ware is contacted with the aqueous sanitizing solution for about 1 to 30 seconds. *~28*

10

37. The method of claim 30 wherein the ware is contacted with mechanical action in the first basin with the aqueous detergent for sufficient amount of time to substantially remove food soil and the cleaned ware is contacted with the aqueous sanitizer solution for about 1 to about 30 seconds. *~29*

15

38. The method of claim 30 wherein the concentration of the chlorine source is about 1 to 100 parts per million in the solution. *~30*

20

39. The method of claim 30 wherein the indicator comprises FD&C Dye #40. *~31*

40. The method of claim 30 wherein the indicator comprises FD&C Dye #3. *~32*

41. The method of claim 30 wherein after the sanitizing step, the ware is permitted to dry without contact with mechanical action or an aqueous solution. *~33*

25

42. The method of claim 30 wherein the sanitizing solution is made by diluting a powdered solid comprising:

(a) about 1 to 90 wt% of an encapsulated chlorine source; *~34*

(b) about 0.01 to 1.0 wt% of a dye;

(c) about 0.5 to 20 wt% of an acid source; and

(d) a major portion of a builder salt.

30

43. The method of claim 42 wherein the encapsulated chlorine source comprises an encapsulated chloroisocyanurate compound. 35

Sup 12 44. The method of claim 42 wherein the encapsulated chlorine source comprises a particle of the chlorine source, a first inorganic layer and a second organic layer. 36

45. The method of claim 42 wherein the dye comprises FD&C dye No. 40. 37

10 46. The method of claim 42 wherein the acid salt comprises potassium dihydrogen phosphate, sodium hydrogen tartrate or mixtures thereof. 38

47. The method of claim 42 wherein the builder salt comprises sodium sulfate. 39

15 48. The method of claim 42 wherein the pH of the aqueous sanitizing solution is adjusted to a pH less than 7 and to a pH at which greater than about 80% of the oxidative species is in the form of HOCl and less than about 20% of the oxidative species is in the form of OCl⁻. 40

20 49. The method of claim 42 wherein the dye color is maintained in the aqueous sanitizing solution for a period of time of about 3 to 6 hours. 41

50. A sanitizing solution useful in sanitizing a surface, the solution comprising:

(a) a major proportion of an aqueous medium having a pH less than 7;

25 (b) about 1 to 90 wt% of a source of an encapsulated active chlorine source resulting in at least 100 ppm active chlorine;

(c) an effective amount of a dye; and

(d) a solid diluent or extender salt. 42

243

100% sodium

add B14

[illegible]